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Application Serial No. 09/944,572

CLAIMS

1. (currently amended) In a network for high-speed transmission of digital data, said network comprising a memory,

an apparatus for rapid differentiation between input data, the apparatus comprising:

a module comprising a functional element[[s]] for each of adaptive, programmable, predictive randomization of said digital data; and

said module comprising at least one programmable feedback shift register that is driven by said input data, wherein a final state of said at least one programmable shift register is used as an index into said memory to determine which if any input data pattern has been matched;

wherein said functional element for predictive randomization comprises means for permitting a plurality of possible randomization feedback path mappings to be maintained in said memory at any time;

wherein said functional element for adaptive randomization of said input data comprises means for adjusting said randomization feedback path over time to handle changing input data patterns that are to be analyzed,

said apparatus further comprising:

means for maintaining statistics on substantially all presently evaluated feedback randomization path mappings to determine a best randomization feedback path mapping, as well as any randomization that is no longer usable; and

means for quickly bringing substantially all of said input data patterns back to evaluate other possible randomization patterns when a randomization is no longer usable;

wherein input data pattern matching effects data classification.

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2. (Original) The apparatus of Claim 1, wherein said at least one shift register comprises a register having at least two feedback paths that can be programmed to be enabled or disabled.
3. (Original) The apparatus of Claim 2, wherein said at least two programmable feedback paths are comprised such that output values from one feedback path are uncorrelated to output values from another feedback path.
4. (Original) The apparatus of Claim 3, wherein general probability theory to be used to evaluate randomization of said input data.
5. (previously presented) The apparatus of Claim 1, wherein said element for predictive randomization comprises means for pre-calculating said randomization for each possible input data pattern.
6. (Original) The apparatus of Claim 5, wherein said pre-calculation is performed at a time that a new input data pattern is entered.
7. (Original) The apparatus of Claim 1, further comprising:  
means for performing a full hardware calculation of expected randomization outputs for each input that is applied.
8. (Original) The apparatus of Claim 7, wherein a plurality of randomizer feedback values are evaluated in real-time when a new input is applied.
9. cancelled
10. cancelled
11. cancelled

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12. cancelled

13. cancelled

14. cancelled

15. (Original) The apparatus of Claim 1, further comprising:

means for implementing sequential masking operations on said input data to accomplish sequential randomization of said input data patterns.

16. (Original) The apparatus of Claim 15, further comprising:

means for permitting either of fixed or programmable masking of selected bit patterns within said input data.

17. (Original) The apparatus of Claim 16, wherein said masking operations permit a user to pre-program a series of masking decisions that can result in a final input data pattern match.

18. (previously presented) An apparatus for rapid differentiation between input data comprised of a limited number of input data bits, comprising:

a randomizer for providing a usable feedback randomization pattern, for a random set of received inputs, based upon an effective mapping of received input data patterns to output vectors, the randomizer comprising

a primary randomizer for mapping each received input data pattern to an output value, wherein sufficient randomizer feedbacks are simultaneously evaluated to provide that a usable feedback is substantially always available; and

a secondary randomizer for differentiating between received input data patterns that have been mapped to a same output value;

wherein entries in each of multiple data input patterns are different from each other said secondary randomizer comprising:

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means for permitting a set value of multiple output cases where any of a plurality of input data patterns map to a same output pattern, said means for permitting further including means for evaluating a plurality of paired, tripled or quadrupled output vectors from said primary randomizer.

19. cancelled

20. cancelled

21. cancelled

22. (previously presented) The apparatus of Claim 18, wherein for a given number of output states, a given number of received input data patterns, and a given number of multiple outputs, said means for handling determines a probability that any specific randomizer feedback maps said input data patterns into a usable set of output states.

23. (currently amended) A method for ultra-high speed data classification, comprising the steps of:

providing a data framer comprising an adaptive programmable randomizer, the randomizer comprising primary and secondary randomizers for framing input data;

providing a complex circuit for permitting a user to differentiate between a plurality of different patterns in said input data, said complex circuit performing the step of:

performing serial mode classification of said data to produce extremely fast characterization in a predictable timeframe by performing adaptive programmable randomization to differentiate between input vectors[[.]];.

wherein adaptive, programmable randomization comprises the steps of:

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maintaining multiple input pattern mappings associated with different primary and secondary randomizer equations; determining a best randomizer selection; deciding when to switch randomizer values; and determining when a randomizer value is no longer useful and an entirely new mapping should be generated.

24. (previously presented) An apparatus for ultra-high speed data classification, comprising:

a data framer;

said data framer comprising an adaptive programmable randomizer, the randomizer comprising primary and secondary randomizers; and

a complex circuit for controlling said adaptive programmable randomizer, wherein said primary and secondary randomizers are programmably configured by said complex circuit;

wherein said complex circuit maintains multiple input pattern mappings associated with different primary and secondary randomizer equations, determines a best randomizer selection, decides when to switch randomizer values, and determines when a randomizer value is no longer useful and an entirely new mapping should be generated.

25. cancelled

26. (previously presented) The apparatus of Claim 24, said data framer further comprising:

a plurality of registers for setting up feedback configurations for said randomizers.

27. (previously presented) The apparatus of Claim 24, said data framer further comprising:

a randomizer enable control block.

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28. (Original) The apparatus of Claim 27, wherein a clock to said primary and secondary randomizers is gated ON and OFF by an enable randomizer signal that is generated by said enable control block; and

wherein said enable randomizer signal is turned on at the start of a packet.

29. (currently amended) The apparatus of Claim [[25]] 24, said data framer further comprising:

a masking control block that allows programmable, sequential, user controlled masking of groups of user defined bits.

30. (currently amended) The apparatus of Claim [[25]] 24, said data framer further comprising:

an output register synchronization and queue that assures that said primary randomizer, said secondary randomizer, feedback registers, and masking registers are stored for each packet.

31. cancelled

32. (Original) The apparatus of Claim 24, wherein said complex circuit comprises any of the following:

a microprocessor interface for communicating to a host processor system;

a first memory interface for communicating with either of a stand alone memory or shared dual port memory, for storing data patterns to be matched;

a second memory interface for communicating with a dedicated memory that contains mappings for a plurality of primary and secondary randomizer settings; and

an interface for communicating with said data framer.

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33. (currently amended) A method for ultra-high speed data classification, comprising the steps of:

providing a data framer for framing input data;

providing a complex circuit for permitting a user to differentiate between a plurality of different patterns in said input data;

said user loading input patterns into said complex circuit, said input patterns made up of a combination of data and a plurality of masking steps that are performed on said data-stream input data in a potentially sequential fashion;

wherein said input patterns are loaded into a memory for use in cases where a mapping is discarded and a new mapping must be generated;

providing an equation mapper for generating a randomized value, said equation mapper performing the step of:

calculating randomizer values;

wherein said complex circuit adjusts adaptively to select optimal randomizer settings based on input patterns and masking patterns that have been applied to said complex circuit;

34. cancelled

35. (previously presented) The method of Claim 33, wherein input patterns are handled by an input manager control and state machine function where they are directed into an input register.

36. cancelled

37. cancelled

38. (previously presented) The method of Claim 33, further comprising the step of:

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providing a mapper multiplexer for immediate selection between each of a plurality of possible randomizer outputs associated with each of a plurality of possible randomizer equations.

39. (previously presented) The method of Claim 33, further comprising the step of:

providing a mapper storage control and storage state machine for saving and retrieving values from a plurality of equation mapping tables.

40. (Original) The method of Claim 39, wherein said mapper storage control and storage state machine determines whether a present location pointed to by a primary randomizer value contains 0,1,2,3, or 4 entries.

41. (Original) The method of Claim 39, wherein said mapper storage control and storage state machine is responsible for handling creation and destruction of multiple entries, and adjustment of multiple entry tables that dictate those entries that are used.

42. (previously presented) The method of Claim 33, further comprising the step of:

providing a masking engine for permitting a user to setup sequential masking operations.

43. (currently amended) The method of Claim [[34]] 33, further comprising the step of:

providing a time accelerator for re-mapping a received randomizer value to generate a randomizer value that would have been received if zero values had been clocked into a randomizer for a fixed number of cycles after a received randomizer value was captured.

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44. (currently amended) The method of Claim [[34]] 33, further comprising the step of:

providing a mapper engine, statistics, and state machine for determining equations to be used, and for determining when said equations are no longer usable and need to be replaced.

45. (Original) The method of Claim 44, wherein said mapper engine, statistics, and state machine maintains statistics on all equation mappings that are maintained in a memory, selects a best mapping, and sends said to said data framer.

46-90. cancelled